**Unit 1: Linear Systems**

**Lesson 1: Solving Algebra Problems**

**Warm-up Questions**

1. Evaluate each expression when x = -2 and y = -3  
   1. 3x + 4y b. 2x – 3y + 5
2. Simplify Each Expression  
   1. 5x + 2(x – y) b. x – 2(x + 3y) – (2x + 3y) – 4 (x + y)

**Lesson 1: Connect English with Mathematics and Graphing Lines**

Example 1: Translate Words into Algebra

1. Write the following phrase as a mathematical expression:
   1. The value 5 increase by a number
2. Write the following sentence as a mathematical equation
   1. Half of a value, decreased by seven, is one
3. Translate the following sentence into an equation using two variables. Mario’s daily earnings are $80 plus 12% commission on his sales.

Example 2 : Translate Words into Algebra to Solve a Problem

Ian owns a small airplane. He pays $50/hr for flying time and $300/month for hangar fees at the local airport. If Ian rented the same type of airplane at the local flying club, it would cost him $100/hr. How many hours will Ian have to fly each month so that the cost of renting will be the same as the cost of flying his own plane?

**Let C represent the total cost, in dollars.  
Let t represent the time, in hours, flown.**

**C = 50t + 300**

**C = 100t**

**To find where prices are equal, you would graph the line and determine the point of intersection**

Example 3: Find the Point of Intersection

The equations for two lines are x – y = -1 and 2x – y = 2. What are the coordinates of the point of intersection?

**Method 1: Graph Using Slope Y - Intercept Method**

1. **Rearrange equations to y = mx + b**

X – y = -1 🡪 Y = x + 1  
2x – y = 2 🡪 y = 2x - 2



**Method 2: Graph Using Y Intercepts**

1. Find the intercepts for each line  
   **Equation 1: x – y = -1**
   1. At the x intercept, y = 0 At the y-intercept, x = 0  
      x – 0 = -1 0 – y = -1  
      x = -1 -y = -1  
      Graph point (-1,0) y = 1 Graph point (0, 1)

**Equation 2: 2x – y = 2**  
At the x-intercept, y = 0 At the y-intercept, x = 0  
2x – 0 = 2 2 (0) – y = 2  
2x = 2 -y = 2  
x = 1 Graph point (1,0) y = -2 Graph point (0, -2)

\*Check by substituting x = 3 and x = 4 into both original equations